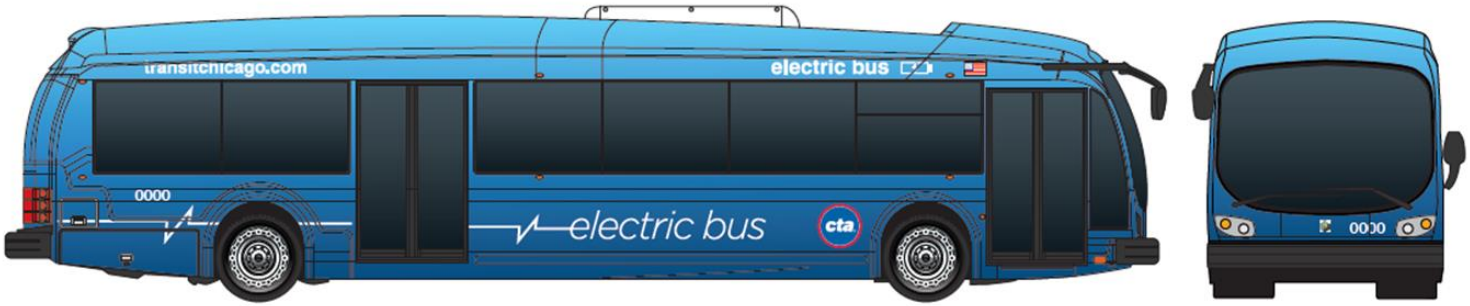


GRID PLANNING FOR CTA ELECTRIC TRANSIT SERVICE

ICC Multi-Year Integrated Grid Plan Workshop

February 22, 2022

Presenter:

Kate Tomford

CTA System Overview

CTA's mission is to deliver quality, affordable transit services that link people, jobs and communities.

CTA's Rail System – All Electric Today
224 miles of track serving 145 stations
~1,480 rail cars in the fleet
64 traction power substations
12 rail maintenance facilities

CTA's Bus System – All Electric by 2040
127 bus routes serving 10,715 stops
~1,860 buses in the fleet
7 bus garages (storage & maintenance)
1 bus heavy maintenance facility

The Importance of Public Transit

A reliable and resilient public transit system is fundamental to making progress on:

Equity

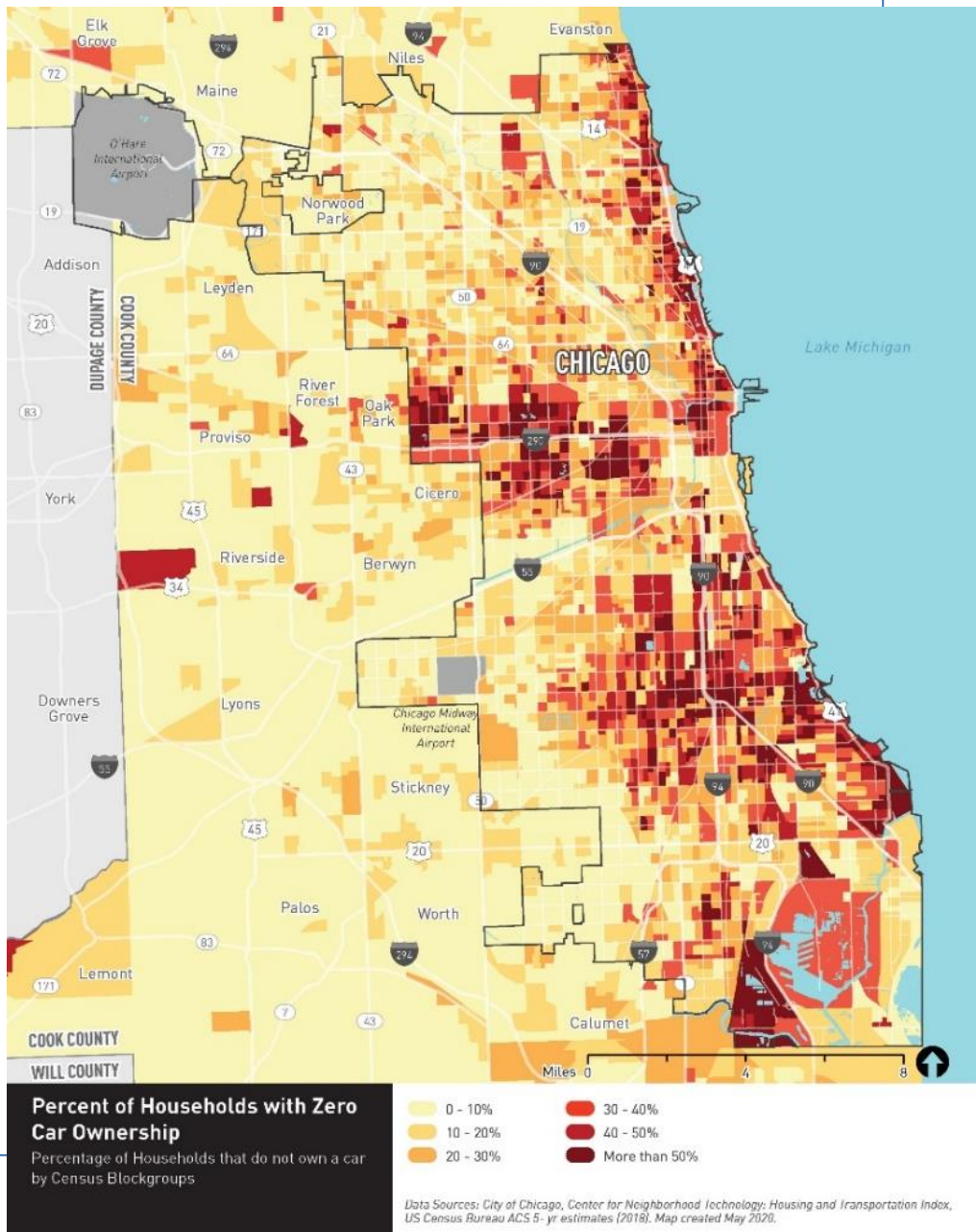
- 96% of Chicagoans live within a 10-minute walk of CTA service.
- ~1/3 of Chicagoans don't own a car.
- Average car ownership cost is $8K/year vs. $900 for 12 monthly unlimited CTA passes

Environmental Impact

- Emissions reductions – local & global
- Traffic congestion relief
- Compact patterns of development

Economic recovery & opportunity

- CTA provides affordable transportation to jobs, education, healthcare, groceries, pharmacies, dining, entertainment, and other destinations essential to our region's economic recovery – and future opportunity.



Expanding CTA's Electric Rail Service

CTA has several major rail improvement and expansion projects in progress, all of which require new or increased electric service from ComEd.

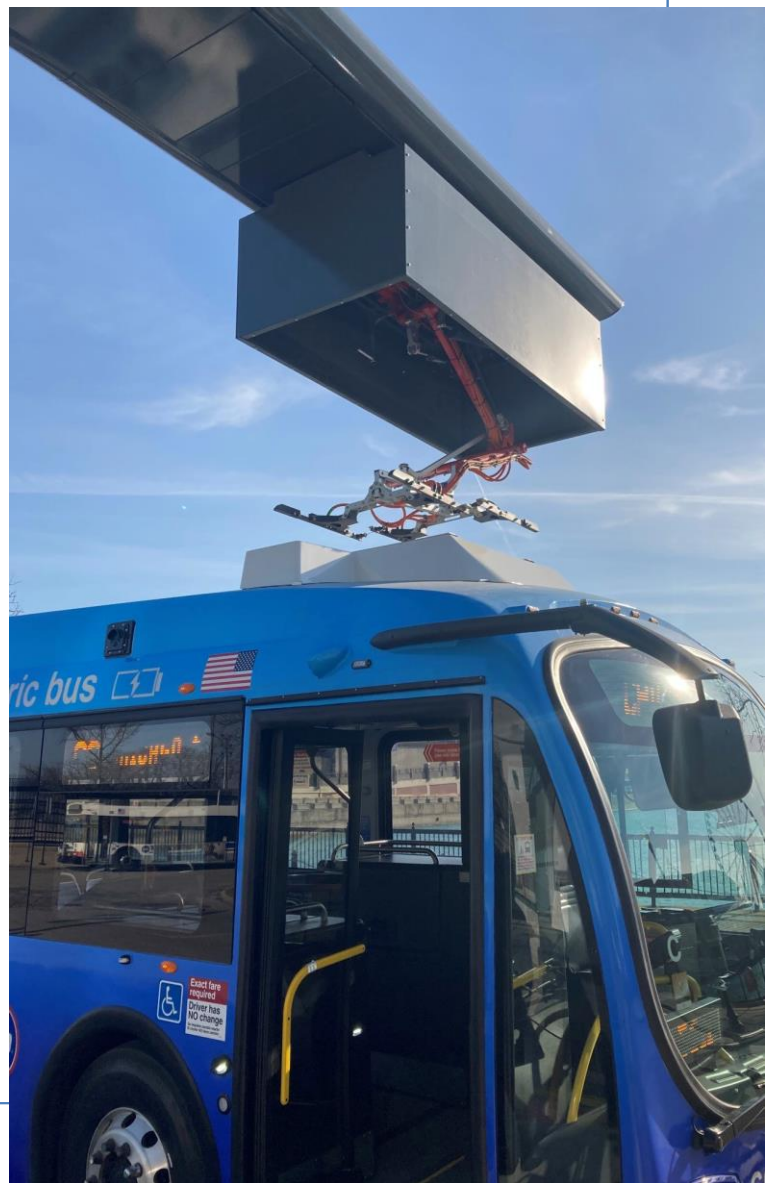
- ***Red Line Extension (RLE):***
  - 5.6-mile extension of CTA's Red Line from 95th Street to 130th Street
  - Five new traction power substations
  - New rail yard and rail maintenance shop
  - Estimated start of construction in 2025; RLE service beginning in 2029

- ***Ongoing Substation Upgrades to Expand Capacity & Enhance Service:***
  - CTA has multiple, large-scale substation improvement projects
  - The "Your New Blue" program includes 3 new substations & upgrades at substations providing power to Red, Brown, Green and Loop lines

Electrifying CTA's Bus System

Electrifying CTA's entire bus system requires:

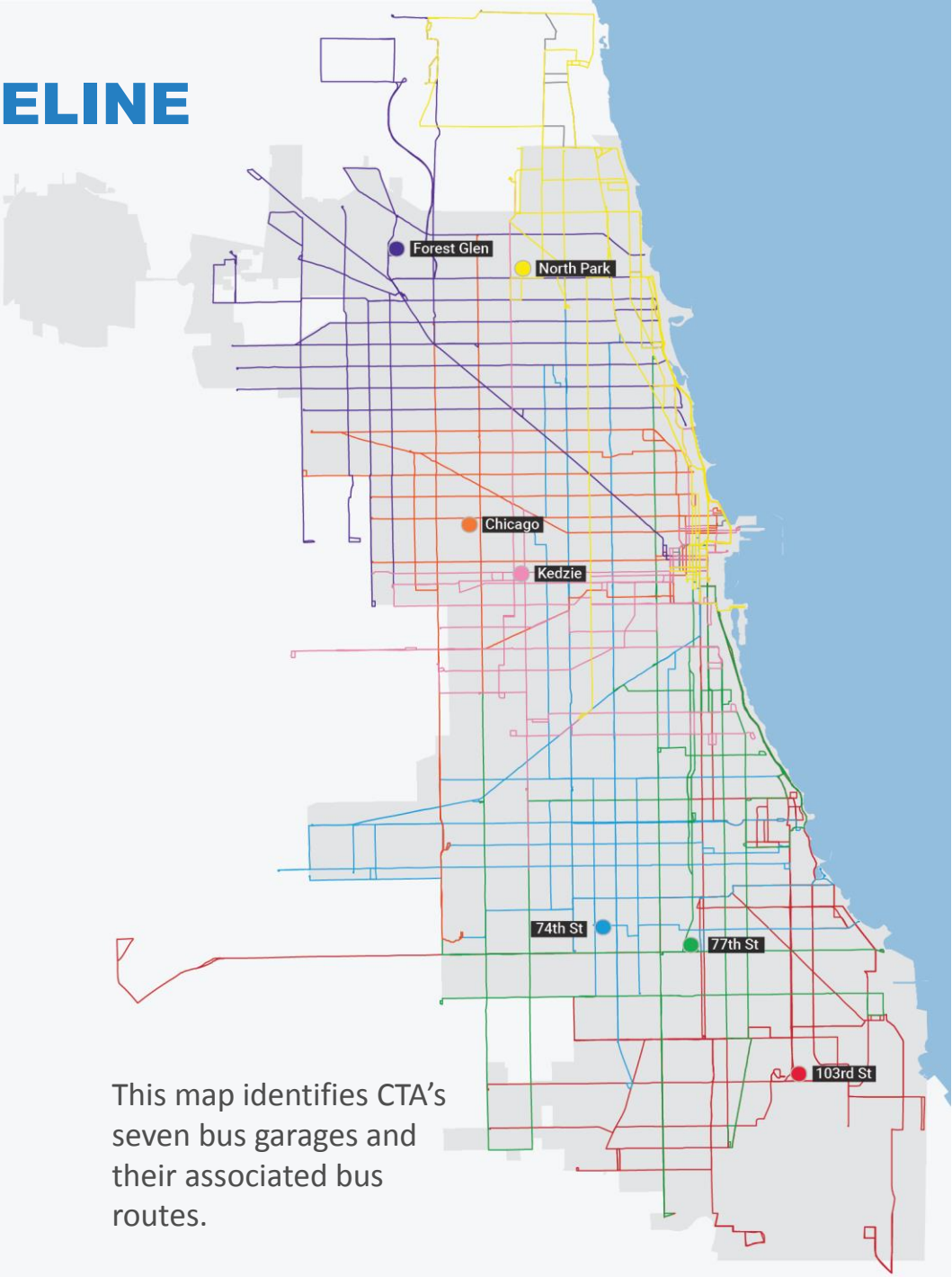
- Replacing over 1,800 diesel buses with electric buses
- Increasing ComEd power to all garages
- Modernizing 7 existing bus garages and the heavy maintenance facility for buses
- Installing charging infrastructure at all garages
- Installing on-route chargers at a limited number of locations
- Constructing a new all-electric garage



Geographic & Timeline Considerations

These key factors drive CTA's planned sequence for electrification:

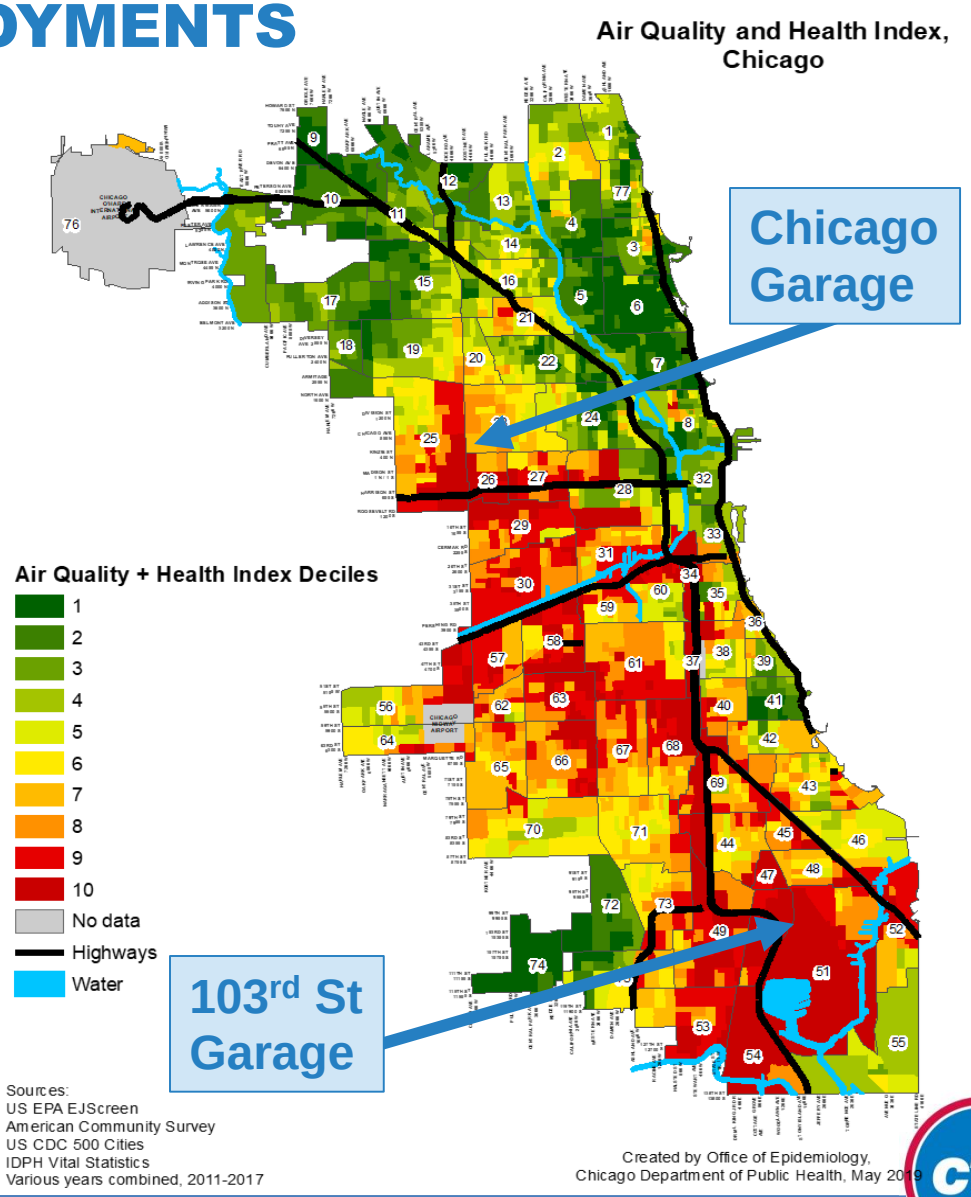
- **Equity** – Prioritize garages and associated routes in disadvantaged communities
- **Facility condition** – Install chargers first at garages with relatively few major upgrades needed
- **Pacing** – Spread out larger garage modernization projects to best utilize available funding and resources



This map identifies CTA's seven bus garages and their associated bus routes.

Equity Basis for Initial Electric Bus Deployments

- CTA's first two target garages for bus fleet electrification are on the West Side and the Far South Side of Chicago.
- CTA selected these garages because communities in the area currently experience among the highest levels of air pollution and health vulnerability today.



Power Requirements at Bus Garages

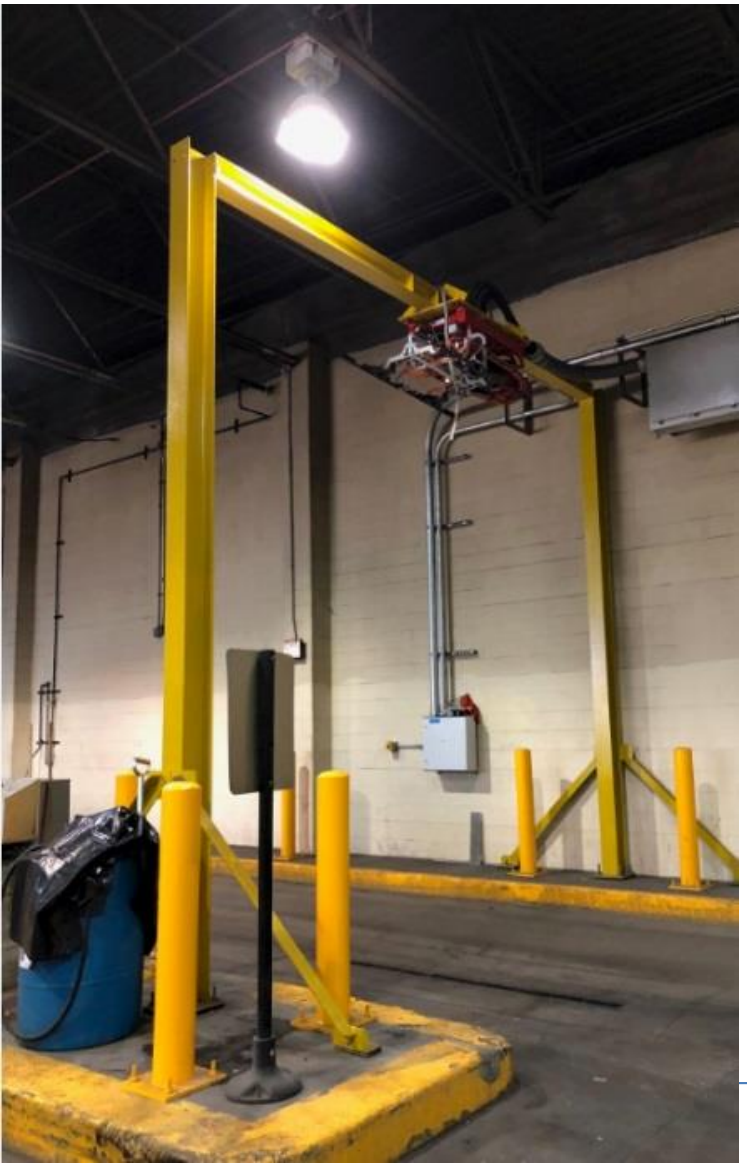
Current Garage Charging Plan

- Install fast chargers in fueling lanes
- Install slow chargers in storage lanes
- Perform most charging in off-peak hours
- Utilize a smart charge management system to optimize charger power levels and schedules
- Upgrade ComEd service to meet new demand; initial estimates are as high as ~20 MW per garage
- Require dual feeds to each garage to ensure reliability

Hypothetical Garage Demand

- 275 buses at one garage
- Each fast charger serves ~25 buses
- Each slow charger serves 1 bus
- 7 x 600 kW fast chargers = 4.2 MW demand (175 buses)
- 100 x 100 kW slow chargers = 10 MW demand (100 buses)
- 4.2 MW + 10 MW = 14.2 MW total demand

Power Requirements at Bus Garages



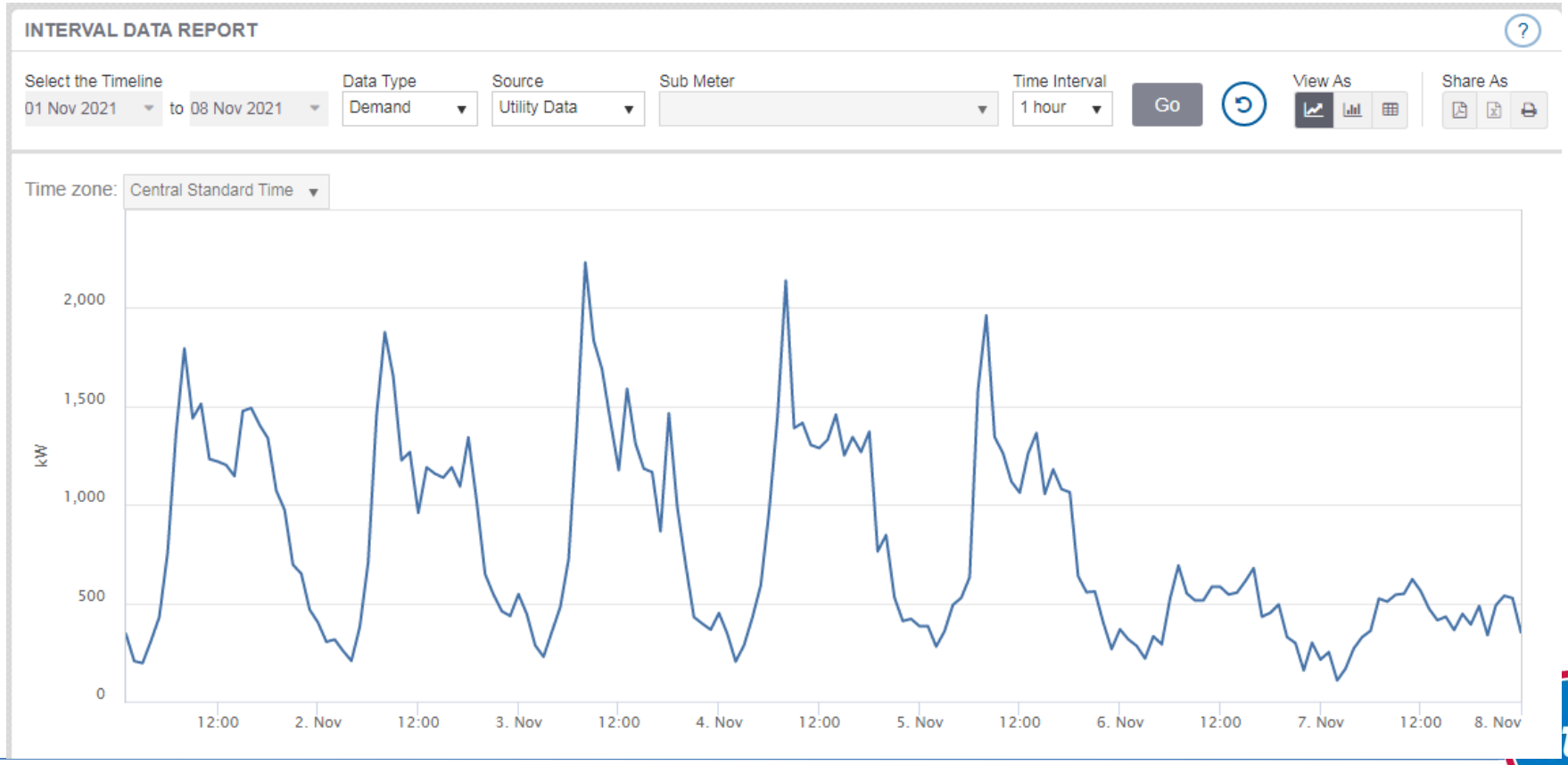
Topics for Further Analysis

- Model bus schedules and garage operations, and simulate scenarios to **forecast peak demand** in more detail
- Analyze the extent to which charge management can **reduce and/or shift peak demand**
- Understand **impacts of technology advances** on peak demand
- Work with ComEd to optimize **power upgrade timing approach**: incremental upgrades vs. large upgrade with capacity reserved for CTA use over time

Demand Profile at Traction Substations

- **CTA has performed extensive modeling and analysis to understand existing and projected power demand at traction substations.**
- **Patterns are well-established in comparison to electric bus charging demand.**

Example of a Demand Profile at Kedvale Substation (Blue Line – Irving Park)



Critical Needs for Electric Transit

CTA needs ComEd's partnership in meeting the following critical needs:

- **Long-term planning –**
  Plan on a 15- to 20-year horizon for increased power to CTA's bus garages and traction power substations

- **Reliability –**
  Provide dual feeds to CTA's charging and substation locations to ensure reliability

- **Sufficient power levels –**
  Ensure peak demand levels at charging and substation facilities can be met